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TRANSLATIONS ON CHINA'S TRANSPORTATION

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TRANSLATIONS ON CHINA'S TRANSPORTATION

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I. DECADE OF DEVELOPMENT IN CHINA'S WATER TRANSPORTATION

/Following is a translation of an article by Chang Wen-ang in Ti-li Chih-shih (Geographical Knowledge), Vol. 10, No. 8, Peking, 1959, pages 339-341./

On the vast plains of China lie the rich natural resources of rivers and lakes, large and small, which store up enormous water power and supply for socialist construction. The artery of water transportation consists of more than 400,000 kilometers of navigable waters and lumber floats, with a total of 5,000 rivers and 900 lakes. The average annual capacity is 26.8 thousand billion cubic meters, being twice the capacity of the US rivers and lakes combined. Navigable inland waters reach 150,000 kilometers of which steamship navigation covers about 40,000 miles, being twice the length of British, German, and French inland navigation combined. Our sea coast stretches to the Yalu River in the north and to the Peilung River along the Chinese and Indo-Chinese border in the south, covering 12,000 kilometers, with 20 bays and inlets. The rivers, lakes, sea coast, and bays constitute a network of transportation, most of which are navigable in winter.

Back in the ancient times, our forefathers used their own wisdom to reconstruct nature, beginning with the primitive raft which opened up inland navigation and continuing until the digging of canals in the Spring and Autumn Era gradually expanded the intricate network of water transportation. First, there were the Western and Eastern dtiches in the Kingdom of Ch'u, then came the Yungtu, Sipu and Pangkau canals in the Kingdom of Wu. Chi and Yoh were seafaring nations in those days; their ships plied as far as Korea, Japan and Indo-China. From the Tang dynasty onward, our water transportation has gradually improved. After the 19th century, under the Manchu and the Republic, for over 100 years, our inland and coastal navigation rights were exploited and alienated under unequal treaties imposed on us by Western imperialists. Foreign merchantmen plied to our heartland and moored in our harbors, plundering our natural resources, and they nipped our water transportation business in the bud.

Since the establishment of the People's Republic of China, on 1 October 1949, and the expulsion of foreign intrusion in our navigation rights, a new page has just begun in the history of China's water transportation. It is no longer a service for the exploiting class but a service for the masses of people under socialist construction. Within 3 years after the inception of liberation, the people's government had succeeded in restoring and improving our water transportation. First, there was the expansion of shipyards and wharves in key harbors, such as the reconstruction of Tangku harbor where ocean liners can berth at high tide, the revamping of Pukau wharves, and the regulating of the Yangtze waterway by restoring and installing navigation signals,

so that steamers can resume night and day sailing between Shanghai and Yichang. Shipbuilding helps to increase transportation potential. In 1952, water transportation was increased by 184 percent compared with that of 1950. This increase greatly facilitated the construction of the Ching River tributaries and the engineering of the Chengtu and Chungking Railroad. At the same time, it cleared the water transportation administration of its corrupt influence of old days and, by a joint effort of the working class, based on the progressive experience of the Soviet Union it rescued the water transportation business from reactionary exploitation. More than this, it also paved the way for the improvement of new waterway construction so as to crumble the embargo by American imperialism and the Chiang Kai-shek regime, and it casts a bright outlook for the future of China's water transportation.

In 1953, at the launching of the First Five-Year Plan, we were able to effect democratic reforms on transportation administration according to our party line. By virtue of sound schemes, studies were concentrated on shipping, harbor loading and unloading situations, and sailing schedules. For more efficient water transportation, progressive and conventional means were employed. For instance, the annual increase in Yangtze Navigation Bureau tugboat horsepower production was from 34.272 kilometer-tons in 1952 to 74.221 in 1957. Because of high productive power and the strict policy of low transportation costs, freight rates have been greatly reduced. For instance, the Yangtze freight and transportation rate in 1957 was 31.4 percent lower than in 1952. In some areas, water freight rates and harbor loading and unloading costs are lower than those of railroad transportation.

During the First Five-Year Plan, gigantic construction programs were worked out for water transportation.

In shipbuilding, within 5 years there was an increase of 1,500 ships of 480,000 tons. The average annual increase is six times faster than that in the past, and the freight capacity, passenger capacity, and tugboat horsepower have surpassed the peak under the Kuomintang regime. Our new ships of modern design are now serving the major lines. Old and salvaged ships are now under reconstruction. Even sail boats have new designs and are equipped with semimechanical equipment.

In constructing and clearing navigable channels and waterways, within 8 years there has been an increase of 70,000 kilometers of waterways, or twice the mileage before liberation, of which 15,000 kilometers are navigable by steamers. Improvements have been made on inland navigation signals, which were scarce and inadequate. Modern chain navigation signals are being installed, and along major waterways navigation lights and electric equipment function automatically and are mechanically administered. Along the coast, lighthouses and radio signals at key points have been built and installed. Even the Upper Yangtze, which is known as Nature's Forbidden, is now open to navigation day

and night after the installing of sailing signals and the blowing up of rocks. Thus the boatman sings his praises:

> Under party control
> Nature yields to man's role;
> Henceforth, sailing night and day
> Can be cheerful and gay.

Efforts have also been made to harness mountain streams for the service of man, such as the taming of the Kwangjian River in Szechuan, beating a path out of rugged nature with little cost but with a great promise for bettering local economy.

In harbor and wharf construction, the central and local governments have been launching gigantic construction projects for new harbors, wharves and go-downs with modern equipment and better and greater loading and unloading capacity. Within 5 years, there have been added more than 60 new wharves with a total length of 6,000 meters and loading and unloading capacity of 9,110,000 tons. The loading and unloading capacity in such key harbors along the Yangtze as Chungking, Hankow, Nanking, and others has been increased by 2.38 times compared with that of 1952; that of Shanghai, Darien, Canton, and others along the coast has been increased by 1.69 times. Other modernized harbors are the Yuchi coal harbor and the Kankiang commercial harbor in the Kwangchow Bay, which are now serving commercial need.

In dockyard building, there are the docks and machinery owned by the central government and the small, local ship yards, engaged in both shipbuilding and repairing. For instance, the Wushih Dockyard is able to build 100 pontoons of 100 tons each, 30 steamboats of 100 horsepower each and 15 passenger steamers with a capacity of 200 passengers each. At the same time, it undertakes repairing jobs.

The above-mentioned new additions have greatly increased inland water transportation. Despite the US effort to blockade our coastal transportation from the Taiwan Straits southward, our coastal transportation along the North China coast has flourished, and the average total water freight has been increased from 19 percent in 1952 to 23 percent in 1957. This ratio has exceeded the Five-Year Plan for inland water freight, which in 1957 was increased three times that of 1952. As for sea freight, it was increased by 1.5 percent or more Such an increase in freight basically promotes the people's economy and lays the foundation for more efficient water transportation.

In 1953, steamship and sailing ship transportation under capitalist management and private ownership occupied 25 percent of the total steamship transportation and 80 percent of the total sailing ship freight. During the First Five-Year Plan for promoting water transportation, in the process of socializing private ownership in shipping enterprise, the party has succeeded in formulating new policies to adjust water transportation control under peaceful reforms.

In 1958, in the wake of the Five-Year Plan for water transportation, another Five-Year Plan began. Under the great leap forward movement as a result of the antirightist movement and a purge in Communist ideology, water transportation and mass production became a mass movement.

In the first half of 1958 under the great leap forward in agricultural production the vast rural areas opened up farming reforms and hydraulic control. On the one hand, there was felt the need of more navigable rivers and streams to meet growing production; on the other hand, there were created more favorable conditions for improving inland water transportation as a result of digging new streams and cultivating mountains. The masses of people responsible for the task under party guidance have stepped up the water transportation movement by opening up rivers, harbors and shipbuilding. Our water transportation line now stretches from the coast through great rivers to the interior farm lands. Today, steamboats appear on the great rice growing plains of Kiangsu and Anhwei and in the mountain regions in North China. High on the Tibetan plateau, the first tugboat "Lhasa" was launched to navigate the treacherous Yalughenpu River.

In this mass rally for more and better water transportation, the daring and enterprising spirit of engineers and workers opened up competition in technical reforms. Through mechanical and technical competence, they were confident of building boats of greater speed and capacity, with less net tonnage, safe and handy. The shipping process is to be regulated by mechanical devices to save manpower to be used for loading and unloading. They will transform dead waters into living ones by connecting and regulating waterways into a more efficient system of water transportation. In this campaign, they were able to gear the mass movement in the party ideology. They equipped themselves with a daring and creative spirit of repeated experiments and technical reforms, doing away with superstition and encouraging free competition in mechanical and technical studies. They have worked wonders which shoot like blossoms of early spring pouring out their glories.

In steamship transportation, automatic and mechanical devices have now replaced semimechanical and manual handling of shipping and steering. The Yangtze steamers are equipped with automatic steering, harnessing steering tower and engine room control into one single action. The "SS Hoping" is the first to use automatic magnetic and electrical steering equipment, which effects a harmony of action between steering tower and engine room operations. Mechanical control of furnace fire and boiler, of the opening and closing of deck and storage and of lubrication and the removal of old paint, now replaces human labor. Shipbuilding technique has been greatly improved. A 3,000 ton keel takes only 35 days to build; an ocean liner of 10,000 tons, 85 days. In the science of shipbuilding, we have succeeded in experiments with a small winged boat which is able to sail and take

off at a speed of 60 to 80 kilometers per hour. Plans have also been drawn for flying boat transportation on the Yangtze.

In sailboat transportation, the aim is to set mechanized control and operation under the "two reform, one clearance, and four'ized'" movement. (See note)

(Note): The two reforms in sailboat building techniques are model and equipment reforms; the one clearance is to settle the dependents of boatmen and navigators on land; the four"ized" are: to regularize the transportation schedule; to organize swift harbor loading and unloading operations; to standardize the thoroughfare of rivers and streams; and to localize selection of building material.

In some places a joint sail and steam transportation schedule is being worked out, partially fulfilling the semimechanical process of operation, such as has been employed by the Hupei Eastern Sun Transportation Corporation. Other shipbuilding materials have been carefully tested and selected: concrete pontoons and plastic and plywood tugboats. One thing is noteworthy. In this movement, boatmen and navigators and their families who have made rivers their home for centuries are now settled on land.

At the same time, improvement of harbor loading and unloading equipment is an important feature. In many regions local factories and shipyards have turned out cranes, machine straps, hoisting machines, and other labor saving inventions. In harbor engineering, concrete waterfront structure and electric hammering devices greatly facilitate harbor piling works. In harbor dredging engineering, the Blue Mountain Dockyard in Hankow has succeeded in utilizing a high pressure hydraulic excavation process to reach a depth of 13 meters underground. Other gratifying achievements have been made in clearing river beds of rocks by underwater dynamiting at fixed points and of shallow alluvial deposit by an easy channelling process.

A retrospective view of old China's water transportation situation brings us the memory of its backwardness and paralyzed situation. Within 10 short years, a great change has taken place. Under the pioneering spirit of waterway engineers and workers, and with the assistance of the Soviet Union, we are able to achieve the present results, such as new models of seagoing ships, harbor engineering of Yuchi and Kankiangs and further scientific research on water transportation techniques.

Of course, we are not satisfied with the status quo. Greater achievements must be accomplished in regulating the network of water transportation. According to our initial plan, our east-west communications rely chiefly on rivers; north-south communications, on canals and ditches. Plans have also been considered for the joining of the four seas, the five lakes, and the rivers and streams into one artery of communications until all streams lead to Peking and all waterways reach the heart of the commune. The integration of water resources makes water transportation in mountain regions and on

plateaus possible. The reconstruction of the old, yet new, Nanking and Hangchow Canal will soon witness the passing of large freighters at its southern end. A survey for the construction of Sung-Liao and Nan-Kwan canals is in its gradual process of advancement. Navigation along the Yangtze gorges by building high dams would require mammoth engineering efforts calling for gigantic technical skill and survey. Once the dams are built, the thundering rapids of the Upper Yangtze will become what Chairman Mao describes in his famous verses:

> Thus stand the stone walls on the West Mountains,
> By which are tamed the Yangtze gorges
> Into peaceful lakes of deep water,
> And the rapids are regulated, rain or shine.

These dams not only conserve water power of the Upper Yangtze but also maintain a depth of 8-9 meters of navigable channel for steamers to call at the "heavenly kingdom" of Szechuan. This monstrous engineering project is but a beginning of China's transportation enterprise which directly contributes to the betterment of the nation's economy. The engineers and workers will continue to work for this cause under the party guidance.

II. TRANSPORTATION IN THE TSAIDAM BASIN

/Following is a translation of an article by Ts'ui Kwang-hao in Ti-li Chih-shih (Geographical Knowledge), Vol. 10, No. 8, Peking, 1959, pages 342-343./

Communications and transportation are prerequisites for a developed economy. In the short history of cultivating the Tsaidam Basin which is rich in natural resources and yet has no economic foundation, communications and transportation enterprises have been conducted under a pioneering spirit, because the cultivation of natural resources and the values of the wilderness, labor maneuvers, interregional economic ties, and the supply of daily necessities are directly dependent on transportation facilities.

The Tsaidam Basin is a famous inland basin covering an area of 220,000 kilometers and which is 2,600-3,000 meters above sea level. A large part of the basin is the Gobi Desert, a bleak country, where the average temperature all year round is between 0° and 4° Centigrade. There are 5 months in a year when the thermometer sinks below 0° Centigrade and when daylight is short and rain scarce (the average is below 50 millimeters annually). The basin has little vegetation and the soil contains diversified chemical salts. Rivers and streams dry up for months and water is difficult to obtain. From the communications' point of view, the flat landscape and topographical conditions are favorable to a diametrical transportation network. The rich deposits of stone and gravel make construction easy. At the same time nature also imposes an obstacle to communications construction, the land of shifting sands and the bleak and arid country. Such obstacles, however, can easily be overcome under the new social conditions. For the sake of developing the economy of our border racial minorities and strengthening our economic coordination within the country, plans were mapped out in 1954 for the construction of highways into the basin. In 1958 the highway system reached a total length of 4,800 kilometers, the highway transportation network was initially completed, and inland transportation was greatly improved.

Up to the present highways are the nucleus of the basin's transportation. The major highway connects Tunghuang, Monyen, Tungha, Chingjuan, and Chamon with Kaermou, Chaka, Dachaton, and Monyen; these are the communications centers.

The basin is in its initial stage of economic construction. Transportation of goods and commodities is comparatively scarce. Most of the imported goods are mainly factory supplies, construction material, foodstuffs, and daily necessities; most of the exports are mining products and native furs, which come from southern regions and pass through the basin to reach Sining. The basin transportation network borders on the region between Talenha and Nomuhung. In the east the transportation line runs into the Chinghai and Tibet highway; in

the west it connects with the Tungmon and Tunggha transportation line. Evidently, western transportation is more prosperous than the eastern. For this reason Tungmon and Tunggha have become prosperous communications and trading centers of the basin. The nationwide supply of construction material to be shipped to the basin by way of Langchow via Sining and along the Chinhai and Tibet highway, a distance of 799 kilometers in 4 days' time, is estimated to cost 30 cents or more per ton per auto-kilometer for transportation, but if the shipment is carried by railroad from Langchow to Hsiatung via Tunghuang into the basin, it will cost less and save time. Since railroad transportation capacity is large, a greater supply of materials can be expected. It is logical that Tungmon and Tunggha constitute the center of the basin transportation routes.

For the past several years import business constituted the bulk of the basin transportation. This is one of the peculiarities of the newly cultivated regions. Since 1958, exports have caught up with imports as a result of accomplishing the initial stage of exploiting natural resources and the opening of mines and mineral salt deposits which constitute the bulk of export business. On some transportation lines exports outbalance imports.

The Tsaidam Basin is China's treasure chest, the cradle of China's new industrial base for a gigantic economic construction now before us. But present transportation conditions are inadequate to meet the impending need. First, for example, there is the lack of transportation facilities to comply with the increased volume of transportation. At present there are in the basin area 9,000 cars under various industrial units, but the number cannot catch up with the growing transportation need. Inadequate transportation facilities greatly affect cultivation and construction projects. Second, poor highway conditions curtail an increased volume of transportation, and many of the highways are opened first to motor traffic before actual survey and construction work has begun. The natural surface of the road which comprises 40 percent of the total length of roads in the basin reduces the speed of motor transportation and limits its use to several months in a year. Finally, because of the lack of modern transportation means, limited transportation capacity, and the high cost of transportation, there is an increase of construction capital, and industrial construction and production have been effected.

For this reason, the development of the basin transportation is of great urgency. The Tsaidam Basin is one of our newly cultivated areas. Taking the basin communications network from the nationwide point of view, we must consider the following principles.

First, to maintain a balanced development of the nationwide communications network, the development of the basin transportation lines must be integrated into a compact system, thus gaining support from all parts of the nation and in return supporting construction work throughout the nation. The direction of development of basin

transportation should be directed eastward; therefore the network of communications in the eastern part of the basin should receive our attention.

Second, the integration of the basin communications network should take into consideration the present highway system and its further development, fully utilizing the favorable natural conditions with emphasis on important regional development so as to lay out the major routes and their branches. Railroads, highways, and pipe lines must be connected with the railroad as the major transportation means.

Third, for the development of the economy of racial minorities and the betterment of their material surroundings and standard of living, traffic routes must be so arranged so as to run through the key business centers. Railroad transportation in the Tsaidam Basin is of great significance because the region is rich in minerals, mineral oil, metals, and chemicals. Only great loading capacity, speedy transportation, and low cost can meet the need for gigantic construction in the basin. Aside from what has been mentioned above, other factors must be taken into consideration, such as the distribution of natural resources, existing industrial locations and their extent, and the connection between short-distance and long-distance railroad lines. Of course, natural situations and engineering must not be overlooked.

In cultivating resources and promoting economic development and distribution in the basin and strengthening transportation facilities within the region and to the outside world, the reconstruction of the Langchin Railroad which passes through the basin is of utmost importance.

This railroad is the chief artery in Chinghai from Haokow through Sining, Chinghaihu, and Kwanjiachyu to the basin and runs westward through Hiligiau, Dalinha, Greater Tsaidam, and Lanhu, a total length of 1,335 kilometers. This route passes through the key mining districts and farms and is essential to the development of the natural resources and the economy along the line. By railroad transportation the rich supply of crude oil, wrought iron, and mineral salts can be shipped out in large quantities.

According to what has been mentioned, highway transportation in the basin is also important. Since railroad construction takes time and is limited by geographical conditions, highway transportation makes up short-distance needs and meets even long-distance requirements. The significance is that it serves as an extension of railroad lines which are under reconstruction and as a railroad transportation connection, such as the vast area along the Chinghai and Tibet highway in the southern part of the basin. Besides, it serves as a supplement of the railroad line and connects important economic points. The opening up of the construction project also calls, therefore, for highway construction. Naturally, to set a high standard for highway construction is essentially important.

The basin is rich in mineral oil. Oil wells have been found in Hsiangyusashan, Yuchwantsu, and Lanhu. The future of oil cultivation is unlimited. Therefore transportation of crude oil in large quantities must be maintained and solved.

Oil transportation by land can be effected by pipe lines, railroad tankcars and tank trucks, but the shipping of crude oil by pipe line best serves the purpose. Motor and railroad transportation is less desirable and expensive and questionable in the long run. Crude oil transportation is now the chief mission of the Langching Railroad, which is able to ship out large quantities. Now with further economic development in the regions near the railroad and the opening up of Tibet and the increasing volume of railroad transportation through this line, the volume of oil transportation will be greatly reduced. From the economic point of view a 600 millimeter pipe can discharge 10 million tons of crude oil annually, but the cost of laying the pipe line is only half of that of railroad construction for shipping the same amount of oil, and the transportation cost is only 40 percent of that by railroad. For this reason oil transportation by pipe line is the most desirable means in the basin.

Air transportation is equally important, but the present problem is to consolidate and achieve some sort of coordination between the basin and its adjoining areas in the rest of the province, such as the key towns between Sining and the basin line. In the long run the basin occupies a very important role in the nationwide aerial transportation network.

Finally, it must be pointed out that not only very soon will the economy of the basin be based on industry but also the network of communications will be laid throughout the region sooner or later. Geographically, the basin lies between Sinkiang, Kangsu, Hoshi, Tibet and Szechuan and its communications system directly affects the communications network in northwestern and southwestern parts of the nation. It is the nucleus of railroad, highway and air transportation in these regions. This is the chief characteristic of the basin transportation geography.

III. QUANTITATIVE ANALYSIS OF THE DEVELOPMENT RATE OF TRANSPORTATION

/Following is a translation of an article by Yen Te-i in Ti-li Chih-shih (Geographical Knowledge), Vol. 11, No. 1, Peking, 1960, pages 6-9./

Transportation is a branch of study in economic geography. Economic geography is a study of the rate of product distribution and of the conditions for production development and its characteristics. The development of transportation and of its network is directly associated with the development and distribution of production in the various fields of the nation's economy, especially between agricultural and industrial markets, their sources of supply, and transportation centers. These form a network of communications. Water is a natural means of transportation, but improved water and land transportation facilities will make possible the smooth flow of resources. Therefore a logical distribution of transportation system is one key to the promotion of agricultural and industrial production under economic construction.

The distribution of production under socialism is based on the rate of proportional development according to the over-all plan of the national economy, to maintain a definite ratio in the speed of development of agricultural and industrial production and of transportation. Transportation development rate must be based on the rate of development of agricultural and industrial production. The relation between transportation and production ratios, according to the statistics of socialist countries, is a fact. In the Soviet Union, the rate of steel production and transportation in the past 40 years has not only maintained a proportional development, but also they have shown equal development rates within the different periods of expansion. In the peacetime construction period between 1928 and 1940, the annual rate of transportation development was increased by 13 percent and the steel production rate by 13 percent. From 1950 to 1956, transportation and production rates were increased by 11 percent. The industrial production rate was slightly higher than that of transportation. The theory of proportional development rates of production and transportation is based on scientific statistical analysis, which proves the beneficial relationship of a harmonious increase in production and transportation.

In the First Five-Year Plan, our annual transportation rate was increased by 20 percent; our annual production rate by 19.5 percent, a figure which is very close to the transportation rate.

Absolute production quantity and its relative rate of increase are two sides of a question. The absolute production quantity of major industrial products must keep a proportional relationship with transportation capacity. Directly connected with transportation capacity is the fuel problem. At present, studies of the relationship

between coal supply and transportation rate are being conducted. From 1955 to 1957 the total rate of long and short distance transportation development was seven times the total rate of coal production. The railway transportation development rate and other government transportation development rates were 150 percent and 140 percent, respectively, of the total coal production rate. When more statistics become available, we shall be able to establish a definite rate of production and transportation development, and maintain an equilibrium relationship between the two. (See note)

/(Note): Material furnished by the Ministry of Communications under the title: "Problems on Plan of Water Transportation Economy."/

We are now entrusted with the mission of studying the province highway network plan, but the initial stage of study must begin with a study of a model transportation plan and the law of transportation development. In the study of the model transportation plan, we must make an estimate of the long-range transportation development rate of the Second and Third Five-Year Plans directly in conjunction with the study of variation in the development of the local economy and transportation during the First Five-Year Plan and the "great leap forward" period. Such a survey must be based on large amounts of statistical data. By means of synthetic analyses, the survey will estimate a figure in order to determine the proportional relationship. This method is not the same as an ordinary survey and description of economic geography.

In the study of the speed of transportation development in the Ninpo Special District, the mission has raised three concrete topics for study: (1) a study of the proportional relationship between the developments in the various fields of the nation's economy and the increase in transportation, (2) a study of the various means of transportation and their proportional weights based on loading capacity and destination of transportation, thus to achieve a logical balance among railroad, highway and water transportation, and (3) a study of the ratio of increase in major and minor highway transportation and the relation of the increase in minor highway transportation with that of the major routes.

A study of the three topics by means of analytical investigation aims to find the development rate and to regulate the present transportation business.

Because of a lack of statistical data, the study of the relationship between transportation development rates and production rates is limited to a small sample and reflects some problems. From the problems and production mission, we have learned to lay out a plan for the network of communications and through an analytical process to find the development rate.

There are two important aspects of utilizing economic geography in mapping out plans for the network of communications and transportation: (1) the general transportation situation and (2) the development

rate of local production. We are able to study both the development in the various fields of the nation's economy and the related transportation problems. First, there are the questions of the balance of production supply and demand and of logical division of work among the various means of transportation. Then there is the question of the equilibrium of regional distribution and its connection with the major production supply line.

A study of the transportation situation must be based on the present. By extrapolation, we can then predict the long-range transportation development rate. The statistical analysis is based on the following factors: the quantity and destination of major material supply, the density of freight along the chief transportation lines, the average transportation distance, seasonal and monthly variations in transportation rate, and estimates of cost and time along the same line of transportation. From the economic development rate and from the equilibrium of supply and demand as a result of population increase, we are able to estimate the long-range transportation development rate for commodity supply and demand.

In our study of the actual situation of goods supply and of transportation in Shen Hsien, a great effort has been made to classify and to analyze statistical data from 1957 to 1958, in order to have a panoramic view of the density of commodity supply and of highway and water transportation in the county. From statistical analyses and charts, the chief exports are tea, cocoons, bamboo, charcoal, and granite. Industrial manufacture and textile goods are rare.

Highway transportation is more extensive than river raft transportation. According to geographical distribution, the development of highway transportation in the rich commodity supply mountain regions in the west cannot be compared with that in economically backward mountain regions in the east. The density of highway network, taking the county as a whole, is 7.5 kilometers per 100 square kilometers, somewhat longer than the average highway length through the province, which is 7.2 kilometers. The density of streams navigable by rafts is 6 kilometers per 100 square kilometers. With the exception of plank paths in mountain regions, the average density of transportation route is 13.5 kilometers per 100 square kilometers. This proves that the rural transportation situation is favorable. The extension of highways in the northern mountain regions and the repair of glide trails further facilitate the export of large quantities of material supply and makes for the booming economy in the mountain regions. Transportation in the Tantung and Kongku areas is rather difficult; therefore lumber and mining products keep accumulating. The seriousness of transportation difficulty along the major production line poses a great problem. In terms of a statistical analysis, water transportation cost (raft) is higher than that of highway transport. Therefore within the reach of highway transportation development areas, water transportation business has greatly shrunk.

Short-haul transportation still relies on porters and wheelbarrows. The export of more than 68,000 tons of bamboo and charcoal in 1958 required 68,000 laborers. The mobilization of manpower by the mountain commune for this transportation project was 30 percent of the total manpower used for the purpose.

In planning future transportation, we must take the long-range view. We must use the Second and Third Five-Year Plans as bases for developing local economy and for adjusting the annual food production and distribution rates to the rate of population increase in the five or ten years to come. Tea and cocoon production must be planned in order to determine their export quantities and destinations. Bamboo, charcoal, granite transportation rates must be determined by the amount in storage and the source of supply. The distribution of industries and population in the province must be considered.

After all, the planning of transportation routes must consider the export quantity of major goods and their outlet, to make a reasonable distribution of water and land transportation routes. To balance the transportation development rate between supply and market regions by examining the various production goals and to divide the regions into districts to determine export quantities and outlets is indeed a complicated mathematical undertaking.

Water transportation is the chief consideration in laying the transportation network for this area. But this plan is inconsistent with the county plan of channeling waterways and water conservation on the upper streams for irrigation and for generating electricity. Therefore, there must be an over-all plan to utilize water resources for the economic benefits of the whole region.

In our study of transportation development rate, we are told to gather information on the production, value, and shipping of various commodities, and on transportation and consumption rates from 1953-58. At the same time we are to study the actual transportation situation in the 6 years, such as transportation and cargo shift rates by the month and year, by the transportation line and station. Then we are to proceed with the analysis of agricultural and industrial production, building materials, daily necessities and passenger transportation rate. The summing up of actual cargo and passenger transportation situation in Ningpo area and the 14 major kinds of production in this area will furnish us with sufficient data.

In our study of transportation development rate in Ningpo area based on the conditions mentioned above, we have proceeded with collecting materials on the economic condition in 6 years' time after the First Five-Year Plan and the "great leap forward" period. First, there must be some uniform limit of the area and time for statistical observation, based on the total production value and quantity in 1953. Then take up the rate of increase and decrease from 1953-58, using the 1953 figure as a base of 100. Make separate statistical studies comparing water and land transportation and passenger and cargo transportation estimating the rates according to month, year, line and station.

An estimate of the annual transportation rate of all transportation means combined is also based on the 1953 figure to determine its ratio in proportion with production, quantity and value. With the aid of abaci and adding machines, charts and curves were drawn to indicate the quantitative analysis study of materials on our economic resources. These charts were based on the actual transportation development situation and the development of local economy in Ningpo area, to determine its fixed ratio to cope with the economic development rate under socialism.

In a fixed area in Ningpo based on light industry and agricultural production, the development of industry in the past 6 years has been rapid; the output rate is rather complicated. The steel industry is a recent development; this area is poor in coal supply. A study of the two charts given below reaches the conclusion that cargo transportation rate is in direct proportion with the increase of industrial and agricultural production rates and that the cargo shift rate has increased slightly faster than the industrial production rate. During the First Five-Year Plan, taking 1953 as 100, the ratio of cargo transportation and industrial production rates is 1.29:1; industrial production has increased by 1,000 dollars and cargo transportation rate has increased by 15 tons. This ratio may not be conclusive; however, it serves as a datum for an estimate of our long-range cargo transportation rate.

Agricultural produce plays a major transportation role. Since 1952, this region has been designated as surplus food storage. This not only relieves the need of this area but also supplies the want of other regions. The chief characteristic of food supply in this region is its short transportation distance and its quantity. The average range has been 34.2 kilometers in 6 years' time. Transportation has its seasonal limitations; the busiest season is in fall and winter. April is another busy month when seeding season comes. We are entrusted with a study of the transportation rate necessary for the increase of 10,000 tons of foodstuff. The results are given in the four charts of analyses.

The increase in food production and transportation rates is consistent for these years. Because of large consumption, the food transportation coefficient during the First Five-Year Plan was 20 percent, but most of the transport effort is a repetition. The actual transportation rate is higher than that of export rate by 100 percent. It occupies 42 percent of the total food production rate; for the increase of 10,000 tons of foodstuff, there are now 4,200 tons ready to be transported for long and short distances. Therefore the mission of food transportation in this area is a heavy one.

Chart 1

The Increasing Ratio of Cargo Transportation and Agricultural and Industrial Production in Ningpo Area (1953 = 100)

Year	Transportation Rate	Commodity Rotation Rate	Total Value of Agricultural and Industrial Production	Industrial Production Value	Agricultural Production Value
1953	100	100	100	100	100
1954	123.38	122.06	104.54	107.8	102.8
1955	134.55	110.56	110.37	115.3	107.83
1956	190.65	144.89	107.38	134	95.2
1957	217.65	157.07	129.85	158	116.6
1958	358.42	262.50			

Chart 2

The Ratio of Cargo Transportation Rate and Industrial Production Value in Ningpo Area

Year	Cargo Transportation Rate	Industrial Production Value	Increase of Transportation Rate per 1,000 Dollar Increase of Industrial Production Value
1954	1.14	1	17.89 tons
1955	1.16	1	12.7 tons
1956	1.42	1	17.32 tons
1957	1.37	1	12.7 tons
Average	1.29	1	15.1 tons

Chart 3

The Increasing Ratio of Food Supply
and Cargo Transportation in Ningpo Area

Item	1953	1954	1955	1956	1957	1958	Note
Ratio of total food supply	100	107.8	114.4	104.9	109.8	166.9	1953 rate taken as 100
Ratio of total cargo transportation rate	100	123.38	134.55	190.65	217.65	358.42	
Ratio of food production and cargo transportation rate	1:1	1:1.15	1:1.17	1:1.81	1:1.98	1:2.14	

Chart 4

Relation Between the Increase
in Food Production and Transportation Rates (per 10,000 unit)

Item	1953	1954	1955	1956	1957	1958
Total food transportation rate	143.05	154.36	163.18	150.08	157.10	238.79
Total transportation rate	186.79	230.46	251.33	356.12	406.55	669.47
The proportion of total transportation rate in food production rate	1.39	1.49	1.54	2.37	2.58	2.80

Chart 5

Total of Food Production and Its Exported Amount in Ningpo Area

Item	1953	1954	1955	1956	1957	1958	First Five-Year Plan Average	Note
Total food production rate	143.05	154.36	163.18	150.08	157.10	--		Per 10,000 ton unit
Amount exported	26.94	31.26	31.77	38.22	25.92	--	30.8	
Transportation coefficient	0.18	0.20	0.19	0.25	0.16	--	0.20	

Chart 6

Relation of Food Transportation and Production Rates in Ningpo Area

Item	1953	1954	1955	1956	1957	1958	First Five-Year Plan Average
Total food production rate (per 10,000 ton unit)	143.05	154.36	163.18	150.08	157.10	238.78	
Total food transportation rate (per 10,000 ton unit)	51.42	66.77	67.36	71.13	62.97	92.47	63.9
Proportion of transportation rate in production rate	36	43	45	46	40	38	42

From this ratio based on statistical analyses of the yearly rate, the degrees of variation are the results of natural disasters in 1956 and the "great leap forward" movement in 1958. Then the standard of living was raised and the equilibrium of supply and demand was maintained. The rate of food supply as merchandise has not yet been stable. Since the location of food processing has not been logically distributed, transportation efforts have been wasted. This condition will greatly affect and lessen food transportation mission. But it will serve as a coefficient for an estimate of the total ong-range transportation rate in this area.

In our study of the actual transport of the 14 major kinds of production through itemized and quantitative analysis, we hope to find a proportional relationship with other production transportation rates. It is difficult to find the ratio of transportation development rate because of the following limitations: limited production area (cotton and salt for example); the recent use of mechanical transportation means (bamboo and charcoal began utilizing motor and railroad transportation in 1956); instability of production rate (minerals and building material); and many other factors.

Passenger transportation in this area is also a complicated matter. The increase in passenger transportation rate is due to production increase and to the improvement of the standard of living. From the quantitative analysis as shown in the charts below, we have the ratio to show the relationship between the increase in the rate of water and land passenger transportation and the increase in the rate of commodity consumption per capita. For the 6 years, the average ratio is 1.86:1. Merchandise sale rate was increased by one yuan and the average /annual?/ passenger transportation rate increase is 31,000 persons. If the retailed sale of daily goods for the entire area is increased by 1,000 yuan, the average increase in passenger transportation rate is 43 persons. Other factors must also be considered. To rely on only one factor in estimating the long-range transportation rate would be unscientific and impossible.

Chart 7

Relation of Increasing Rate Between Passenger Transportation and Merchandise Retailed Sale in Ningpo Area

Year	Passenger Transportation Rate	Passenger Transportation Rotation Rate	Highway Passenger Transportation Rate	Highway Passenger Transportation Rotation Rate	Average Retail Merchandise Rate Per Capita
1953	100	100	100	100	100
1954	138.67	109.98	148.35	121.41	109.3
1955	158.45	103.12	191.92	147.26	114.69
1956	240.79	112.99	279.84	189.14	131.67
1957	241.81	139.45	338.12	270.31	124.07
1958	376.52	124.22	505.88	271.94	149.62

Chart 8

Proportion of the Ratio of Passenger Transportation and Retail Merchandise Sale Rates

Year	Passenger Transportation Rate	Average Retail Merchandise Sale Per Capita	Passenger Transportation Increase Rate Based on the Increase of One Dollar in Retail Merchandise	Passenger Transportation Increase Rate Based on the Increase of All Retail Merchandise Sale by $1,000
1954	1.26	1	297,500 persons	44
1955	1.38	1	238,300 persons	31
1956	1.82	1	270,500 persons	38
1957	2.35	1	411,400 persons	57
1958	2.51	1	332,900 persons	48
Average	1.86	1	310,100 persons	43

The natural tendency is for geography to develop into a science to promote production process. Whether it be natural geography or economic geography, the method is to pry open existing phenomena and seek out theoretical explanations. Fixed observations and a quantitative analytical process attempt to discover the relationship between existing natural phenomena and the existing economic situation, to arrive at the principle of its natural and social development for the sake of promoting production. In complicated social and natural environments, there is some sort of coordination and restriction in the process of development, revealing the proportional relationship of all factors concerned. Therefore a high caliber study based on figures and indices enables us to put geography on a higher plane of scientific treatment. This is the task of geographical investigation and analysis: reaching from surface description to the underlying stratum of mathematical calculation, in order to find the underlying principle.

A study of the quantitative rate in transportation development is intended to meet the need of production agencies. It is also our mission on production. The conclusion we derive from the large statistical data by quantitative analyses and mathematical computations is but an elementary one. In laying out principles on production distribution, we must rely on speculative statistical analyses and advanced mathematical calculation. We have not yet reached that level. We have listed them in our schedule of plans for the study of economic geography. Besides keeping in line with the policy of the party and state, effort must be made in this direction.

IV. METHODS USED IN THE STUDY OF TRANSPORTATION

/Following is a translation of an article by Lu Hsin-yen in Ti-li Chih-shih (Geographical Knowledge), Vol. 10, No. 7, Peking, 1959, pages 294-296./

1. The Meaning of Transportation Geography and Its Importance

Transportation geography, a branch of economic geography, is a study of the geographical distribution of transport productivity. It is a study of the development and distribution of the communications network in a district or county, of geographical analyses of the flow of cargo, and of the interrelationship between transportation and the distribution of industrial and agricultural productivity. It is a study of the geographical distribution of transport productivity, of the character of conditions for the development of production and transportation. Therefore, its mission is to bear the responsibility of socialist construction and to tackle the problem of the development of production and transportation. In 1958 during the "great leap forward" period, we learned important lessons about transportation, of which, first of all, was the role played by transportation as the forerunner of the people's economy. At present, we are still behind in transportation, unable to meet the needs of growing industrial and agricultural production. Problems, such as the development of transportation routes and the means of transportation in a district and the integration of the communications network throughout the country, are to be tackled by our transportation geography scientists. Up to the present we have not yet succeeded in formulating our transportation geography into a system of workable knowledge, and have to grope our way into it by actual working experience. For this reason, a study of transportation geography contributes a major part of this working experience. From the study of the local transportation situation we come to know its characteristics and the contradictory elements in the development of transportation in order to find a solution to meet the need of the great industrial and agricultural "leap-forward." A study of transportation geography is helpful to geography teaching and to fulfill its scientific mission.

A study of transportation is of two kinds, special and general. Regional study is limited to the distribution of transport productivity. Since the transportation enterprise consists of water, land, and air transportation systems, special study can be further divided into compartmental studies and an over-all study, which is an integration of points of view on the transportation system in a district as a whole. A general study sums up the integrated points of view on economic geography in order to find out a working solution. Since transportation is the forerunner of the people's economy, for the development and service of industrial and agricultural production, we should resort to the general method.

The mission of the study of transportation geography is threefold. First, from the teaching point of view, to understand the special characteristics of transportation by a study of its geographical factors gives us a complete notion of what transportation enterprise can mean and deepens our knowledge of the geographical distribution of transportation and of the principle on which are based the conditions for our transportation enterprises. Second, using transportation geography to adjust the development and distribution of agricultural and industrial production is to integrate transportation enterprise into a system of study of the nation's economy in a particular district. Through investigation, we are able to examine the relationship between transportation geography, and the distribution and development of the national economy in the related areas and its service toward the development of the local economy. Third, elaboration of the study of the communications network by making an analysis of regional variations in the distribution of the local transportation geography, its causes, and its logical distribution, aims at finding a means of improving the communications network.

In the actual working experience based on the characteristics of transportation enterprise, we must make the following two exceptions.

First, the promotion of transportation enterprise must be for the service of production; it is to meet the need of production development.

Secondly, transportation is limited by geographical factors. The integration of transportation facilities by maintaining a coordination of the different transportation compartments because of different geographical limitations, aims at ameliorating their shortcomings with merits. For this reason special attention must be given to the characteristics of local geography, in order to develop different means of communications. At present, our attention is fixed on swift and effort-saving transportation means to effect a close cooperation of transportation on major and branch lines and over long and short distances.

2. Contents of Study on Transportation Geography

The contents of study of transportation geography consists of the following points:

(a) Effect of natural conditions on the distribution of transportation routes. Transportation enterprise is now actually in the process of developments to overcome obstacle to space travel because of natural conditions. Its relation to natural conditions is only second to that of agriculture. Since natural environments determine the distribution of transportation, land transportation must take into consideration the topographical phenomena, the most important of which is earth surface and slanting degree. (See note)

(Note) Slanting degree indicates the elevating and lowering of highway plane within a fixed distance. Indication is by percentage. For instance, if one hundred meter long highway plane is lowered or elevated by five meters, its slanting degree is 5 percent.

Sloping conditions affect highway transportation efficiency to a great extent. For instance, an automobile without trailer is deprived of 33.8 percent of its loading capacity when it travels on a highway plane of 6 percent elevation compared with its capacity on level ground. As a famous Soviet economic geographer pointed out, in railroad transportation the load of a locomotive which is able to pull cars of 5,000 tons on the level is reduced by 1,400 tons when it climbs a plane of 5 percent elevation, by 800 tons on a plane of 1 percent, and by 400 tons on a plane of 2 percent elevation. In busy cargo transportation areas, railroad transportation lines should not have an elevation more than 6-8 percent. Besides geological factors, soil content also must be taken into consideration.

Water transportation must take into consideration the distribution of river and stream network, the length and depth of navigating channels, tidal speed and variation and soil content. Climate also affects water transportation to a great extent, for example rain, temperature and wind. Severe cold, storm, and rough water are great obstacles to water transportation. Air transportation at present is closely dependent on weather conditions.

Besides, considerations of the various means of transportation, based on the integration of study of the natural environments of a district, we must give our attention because of geographical limitations, to the employment of glide-way, water float, and rope suspension transportation processes in mountain regions.

(b) Historical and geographical factors. A study of the historical background of the local transportation enterprise, the date and origin of transportation, the development of transportation conditions and distribution, and the influence of its traditional characteristics on modern transportation geography are major factors.

(c) The local economic conditions. This is a study of the people's economy based on the observation of transportation conditions, especially the coordination of transportation means within and without the region, the distribution and use of natural resources, the character of productivity distribution and development, the formation of the various economic enterprises of the people and their mutual relationship, the technical and economic coordination and economic centers within and without the region, and the distribution of population and the law governing population migration. Based on these principles, we are able to discover the actual situation of passenger and cargo transportation as a foundation for the distribution of transportation enterprises in this region.

(d) The various transportation compartments, transportation lines, and analyses of different transportation means. This is a study

of the various transportation facilities and their characteristics, the quality and capacity of transportation means and the causes of their use (whether they are compatible with the geographical factors and economic characteristics), the amount of manpower employed in transportation, technical standard and the source of supply in the region, the problem of the use of manpower in transportation, and the adaptability of transportation power to meet the need of economic development in the district.

(e) Serving as freight geography of manufactured goods and production. This is the study of the shipping of major production in transportation industry, the direction of shipment and quantity, and economic evaluation of freight geography.

(f) The soundness of the transportation industry. This is the study of the logical application and promotion of the transportation industry, on the one hand, such as transportation distance, transportation repetition, and adverse transportation situations and, on the other hand, the cause of their formation, the logic of the formation of the network of transportation and its distribution, such as regional equilibrium of transportation mechanisms and the logical distribution of all sorts of cargo and cooperation in transportation. Based on the local situation measures must be taken for further improvement.

(g) Serving as a production center of the transportation industry. This is the study of the nucleus of transportation, such as stations, harbors, and wharves.

(i) Transportation nucleus. The transportation nucleus is the largest production center in the transportation industry. It is the intersecting point of all sorts of passenger and cargo transportation and the carrying out of the transportation mission and the integration of all transportation facilities. It is usually a large city, harbor, or station. Shanghai, Hankow, Tientsin, and Canton are our large cities and harbors. Emphasis must be laid on the study of conditions for the formation of a transportation nucleus, such as geographical location, its characteristics of economic magnetism, natural environments, and the supplement of the various transportation compartments, such as railroad station, bus depot, waterfront, and godown, and the equilibrium of the transportation rate. In the study of a transportation center as an economic center of a district or county, we must explore its problems and defects in order to find out a solution.

(ii) Stations. The railroad station is the center of land transportation and is comparatively important. This is a study of the kind of station and its location; its relation to the distribution of industrial and agricultural production and of population and commerce in the district; natural conditions for station building, such as its geological foundations, water supply, fuel supply, and wind direction, and its association with other transportation centers (united water

and land transportation service); its transportation rate and unloading and loading capacity; its sphere of service and the economic features of specialized production in this area; and characteristics of its transportation mission, cargo or passenger transportation, cargo shipping direction, and major products for shipment. Bus depots are comparatively simple. The line of two major highways is called the highway transportation nucleus. The sphere of study is about the same as that of railroad station, but the emphasis is laid on passenger transportation. At present our highway transportation is gradually shifted toward a joint transportation service. Therefore care must be taken to improve station equipment.

(iii) Harbors and wharves. Harbors and wharves are the center of water transportation. They are the nucleus of water and land transportation service. There are two kinds of harbors, river and sea harbors. The wharf plays a major role in harbor life. It is the berthing, landing, loading and unloading place of ships, passengers and cargo. A small inland harbor is made up of wharves. Therefore, harbor construction must first take into consideration the question of wharf building. Sea harbors are built along the coast, as a reception center of outgoing and incoming sea and ocean liners. The economic value of a sea harbor is determined by the following factors determined by a study of the general conditions for harbor construction. First, harbor bosom land. That is the area that comes under its economic influence and which has an outlook for greater economic development. As a rule, the larger the area, the greater its economic expansion; the harbor transportation capacity and mission will be increased. A fully utilized harbor would ensure great economic benefits. Second, the direction of foreign trade and transportation conditions along the coast. This is a study of the harbor geography in regard to its meeting the demand of foreign trade and the need of coastal transportation. Third, the harbor natural conditions. Such a study includes the width and depth of water channel and its soil deposit, the length of time closed by ice, and the tides. Fourth, loading and unloading and storage capacity. This deals with the question of the quantity, quality, and equilibrium of harbor equipment; the coordination of all transportation means; and the maximum amount of cargo handled by the harbor. Inland harbors are built along the river for the service of river transportation. The study of harbor conditions is the same as that for a sea harbor. A small inland harbor is made up of wharves. Characteristics to be studied are its geographical location, sailing conditions, and cargo storage space.

3. Method and Procedure of the Study of Transportation Geography in General

(a) A study of the transportation policy and communications plan. This is based on a study of problems on transportation geography.

For example, the development of transportation in a region and the distribution and improvement of the network of communications are basically a nationwide plan. It must be done under the direction of an over-all plan of the party and the masses of people. (See note)

/(Note): Transportation plans are based on the point of view and creation of the masses of people under party leadership. They must be integrated into the whole economic plan, worked out by a mass effort, and be universal in their application./

(b) The collection and analysis of related data. It is to seek out existing problems as a supplement to actual observations and to outline the important points of study. Methods of collecting materials are as follows: (i) Gathering official statistical materials, such as on regional transportation lines and means, transportation conditions, and a long-range transportation map, and the development of transportation enterprises. (ii) Gathering materials on railroads, stations, harbors, and wharves, such as transportation mileage, transportation conditions on the various lines, and transportation schedules, in order to determine transportation density and major materials for shipment. An analysis of materials on natural and economic geography also enables us to understand the physical features of the district. From the analysis of map and materials we are able to sketch out its transportation lines, direction of freight, and locations of material supply.

(c) On the spot observations. This is to substantiate our gathered materials by actual observations. There are three steps to the observation: First, along the line. That is to select a section of a transportation line and make an observation along the line. That section should be so selected as to represent the character of the entire region and by the study of which to seek out the relationship of the various transportation compartments and the general characteristics of the local transportation situation. Observation along the line is based on the following points: the natural conditions of the line, that is its thoroughfare; the effect on the living standard and economic conditions of the people along the line; the flow of major materials for shipment, direction and transportation rate; and existing problems on transportation facility. Second, on particular points. That is to select a nucleus of transportation for study, such as a wharf, station, harbor, or point along the line, in order to find out the productivity of the line, its existing problems and its relation to the economic development of the neighborhood area. This is to supplement the shortcomings of observation along the line. Third, general observation. This is an integrated study of the economic situation of a district as a whole, a study of the transportation geography of a district from its physical features. The three methods should be employed throughout the actual process of observation.

4. Conclusion

From the conclusion reached by analyses and inductive methods, a solution to the development of the local transportation business based on natural and economic conditions, must be worked out in the process of "line, point and general" analyses.

The so-called "line and point" analyses are to describe the present transportation routes, transportation centers, freight geography, and existing problems.

A general analysis is a study of the network of communications based on the following points: the different transportation compartments that make up the communication network, major transportation lines, and logical supplementary branch lines, the distribution of transportation, the mission of the various transportation compartments and future improvement, the presence of communications obstacles in transportation network, contributions toward the local economy, and solution (including layout of transportation routes).

V. HARBOR OF SHANGHAI

/Following is a translation of an article by Yen Chung-min in Ti-li Chih-shih (Geographical Knowledge), Vol. 10, No. 7, Peking, 1959, pages 305-307./

China is a country of long sea coasts and numerous harbors. Our sea transportation occupies an important part of our transportation enterprise, not only because it is responsible for the interflow of goods, but also because it maintains the relationship of all fields of production. The geographical distribution of harbors as a nucleus of transportation, as a Soviet geographer puts it, is a reflection of the formation of an economic relation between the nation, the district and the great industrial center. To some extent the magnitude of harbor utilization is limited by its geographical environments, and undergoes changes under different social and historical factors. The harbor of Shanghai cannot be an exception.

A. Ideal Geographical Location and Natural Conditions

Shanghai is located at east latitude 121°29' and north longitude 31°14', on the eastern tip of the Yangtze Delta and in the center of the eastern coastal line. Therefore, it is a link between Tsingtao, Tientsin, and Darien in the north, and Ningpo, Amoy, Canton and other harbors along the Han River in the south. The distance between Shanghai and Vladivostok and Shanghai and Hongkong by sea does not exceed 1,000 miles. The central geographical location is favorable to north and south transportation.

Situated at the mouth of the Yangtze River which empties into the sea, the harbor of Shanghai has access to a vast bosom land. The Yangtze area is more extensive than any other river area, covering more than 1,800,000 square kilometers with a population of more than 2.5 million, and possessing rich resources, and a well-developed economy. With its enormous transportation capacity for importing and exporting goods by cheap water freight along the year-round navigable Yangtze, Shanghai becomes the artery of sea and inland water communications, a major link along the Yangtze. Such an advantageous geographical location has no match in the nation or in the world.

Located at the mouth of the Yangtze and the intersection of the Whampoo River and the Soochow Creek, Shanghai has the dual characteristics of sea and river harbor. The harbor penetrates deep into the Whampoo River, covering 10 kilometers of waterway where ocean liners can berth. The Whampoo River cuts Shanghai from south to north, covering 113 kilometers and empties itself into the Yangtze. It is an outlet for 80 percent of water in Lake Tai area. Shanghai harbor is deep, broad, and navigable all year round. Liners of 6,000-7,000 tons can sail up the river, but Tungsha at the mouth of the Yangtze is

shallow water; therefore liners over 10,000 tons have to rely on high tide for their entry. This is a great obstacle to the harbor transportation.

The Soochow Creek rises in Guajinko in Wukiang Hsien and cuts eastward through Shanghai and empties into the Whampoo. In ancient times, it was the only outlet of Lake Tai and because of its penetration into the Lake Tai area, it is an artery of inland navigation and transportation and serves irrigation purposes. Despite the fact that the river bed has become shallow as a result of silt deposits, it still is an addition to inland transportation power, handling 4 million tons of cargo annually, and extending the Shanghai inland harbor areas. After the creek has been dredged, its significance will be even greater.

The accumulation of soil deposits on the river bed as a result of tidal erosion, though less serious than that on the Tanku harbor water-way, requires constant dredging. At high tide, go-downs and storage areas are partially flooded, but the channel is deep enough for ocean liners to navigate the shallow stream.

The flat delta is an ideal wharf and go-down location. Many of the former wharf locations are now utilized for housing projects, thus limiting storage space and the further expansion of the harbor.

The climate is mild, with an average temperature of 15.3° Centigrade with a hot summer and a mild winter. Therefore the river is navigable all year round and rainfall is plentiful in summer, averaging 1,141 millimeters. The rainy season occupies 128 days a year, affecting harbor loading and unloading to some extent. In addition there is the typhoon season from summer to autumn with high winds and torrential downpours, which also affects harbor transportation. Because the harbor lies inland little damage is done to shipping. Since the harbor is rather close to the sea, humidity is about 80 percent and there are 65 days a year of foggy weather, but these factors have little effect on transportation.

After all, the superior location of Shanghai harbor is formed by naturally navigable channels of the Yangtze, the Whampoo, and the Soochow Creek, which form a communication system in central China through the connection of the Shanghai-Nanking, Shanghai-Hangchow railways. Its communication area extends deeper and wider than that of any other port in China.

B. History of Harbor

The prosperous harbor of Shanghai was a fisherman's village several hundred years ago. In the latter Ming period, European missionaries, in the wake of Portuguese influence in Macao and Amoy, came to Shanghai. Shanghai did not become a trading port with the outside world until 1633. Later the Shanghai Maritime Customs was organized and Shanghai gradually became a trading port of growing importance. The early history of the county records these words:

"Seagoing ships from Fukien and Kwangtung bypass the shallow Liu Creek and enter the harbor via the Soochow Creek, and masts of ships bristle at the eastern end of the city." Their gathering spot was along Siliupu and Tung Ferry; most of them were seagoing sailships and river sailboats.

After the Opium War, the Manchu Government was forced to open Shanghai to foreign trade in 1843. Western colonists had occupied this area for 105 years. For a century, imperialists had utilized the superior geographical location of Shanghai as a base to exploit the Chinese economy and plunder its national resources. Under extra-territorial rights they built wharves, go-downs, and storage areas, and before liberation, 37 percent of Shanghai wharves and 56 percent of its go-downs were owned by foreign merchants. They controlled Shanghai customs, exported large quantities of manufactured goods, such as textile goods, daily necessities, luxuries, some machinery, fuel, metals, and even opium, and gathered raw materials, such as tea, silk, mine products and native products, thus transforming Shanghai into a base to exploit China's resources and to absorb the Chinese economy. According to statistics, between 1871 and 1947, Shanghai always ranked first throughout the nation in foreign trade, her highest percentage being 69.4 and her lowest over 41. At the same time, it was Old China's chief port for import trade, the total imports in 1946 being estimated at 305 million US dollars.

The development of trade in Shanghai resulted in unusual prosperity for the city. There were numerous foreign companies; their goods piled up like mountains; foreign warships patrolled our waters; foreigners strutted in the streets. Shanghai was the paradise of adventurers who stood out in sharp contrast with the masses of Chinese laborers whom they exploited.

In 1949, Shanghai was liberated and a century of disgrace and humiliation ended. Control of customs was returned to Chinese sovereignty. The harbor organization has undergone changes and improvement. Our harbor pilots are now steering foreign ships to safe entry into the Whampoo. Shanghai is no longer a harbor of excess import trade as in old days. It has become China's largest sea and river transportation center and one of the world's greatest ports. It plays an important part in developing the nation's economy and transportation. With the "leap forward" in agricultural and industrial production in Shanghai and throughout the country, import and export capacity of Shanghai has registered a proportional increase. During the First Five-Year Plan, there was an impressive increase in trade. Today Shanghai is not only a sea and river transportation center; it is a base of material supply for national construction as well as for its own buildup. The Whampoo rolls on as usual, but the harbor of Shanghai under New China has undergone fundamental changes of character.

C. Harbor Districting and Trading Characteristics

1. Layout of Harbor District and Equipment. A change from the old harbor plan into new harbor districts poses a difficult question, which limits the harbor development plans. From Woosung to Minhong, within a considerable distance of deep water harbor, new districts can be made. The present shipping center is located in the vicinity of Lunghwa, Fushing Island, and Pooshi. The harbor is divided into districts according to the distribution of go-downs, wharves, navigable channels and loading and unloading equipment. For instance, Pootung is far away from the city; it is likely to be developed into a go-down and storage area, a transportation base of heavy, clumsy, or less urgently needed materials. Pooshi and Siliupu have long been berthing centers for river and sea-going ships. Yangtzepoo is a factory area where freighters are gathered for import and export purposes. Kaoyang Road wharves are near the city; they are the mooring stations of ocean liners. For greater transportation efficiency, the wharves along Ihui harbor and Peipieu were made into transfer points from land transportation in 1955; trains can reach the wharves, thus shortening loading and unloading distance. The Soochow Creek is mainly the gathering place of sailboats, but there are no wharves.

The harbor now has nearly 10,000 meter long wharves (over half of which are permanent wharves), capable of harboring many ships and pontoons with increased capacity for mechanized loading and unloading equipment. This also increases export and import capacity, which in 1958 was 100 percent more than that of 1956. But the increase still cannot satisfy the need of growing industries in Shanghai, because the wharves are too crowded together and the go-down space is limited. With the exceptions of Kaiping and Peipieu wharves which have railroad connections the rest are deprived of such transportation facility. Therefore, besides strengthening mechanized loading and unloading power and dredging the channels and shallow waters at the mouth of the Yangtze, the building of new harbor wharves is of impending importance. Near Woosung new wharves are now being built to meet the needs of water and land transportation for domestic and foreign trade. In the future, after the completion of the Whampoo enbankment, with roads and railway tracks to connect Pooshi and the Pootung transportation facilities, Pootung's wharves can be further developed. This measure helps solve harbor districting plans and opens a way to accommodate transportation capacity with labor power.

2. Trading Characteristics. For a long period, Shanghai trade has been ranked first in the nation. Before liberation, there was a strong tendency toward dependence on foreign trade. The chief exports were agricultural produce, native products, handicrafts, and mining products; these items occupied one fourth of the total export. Large quantities of indigenous products were gathered here to be shipped

abroad, and only a very small percentage were local industrial manufactures. Most of the imported items were luxuries and supplies for light industry. Before the First World War, opium imports occupied 10 percent of the total import rate, the maximum being 37 percent, which was indeed characteristic of colonial economy.

Since liberation Shanghai domestic and foreign trade has undergone the following fundamental changes:

(a) Rapid increase in trading rate. During the First Five-Year Plan, Shanghai export and import rates were increased by three times. There was an increase of 63 percent in 1958 compared with that in 1957. This fully manifests the rapid growth of our production and foreign trade. The increase during the Second Five-Year Plan will be even greater.

(b) Leading role in domestic trade. In 1957, domestic freight occupied 92 percent of the total freight for the port of Shanghai: North and South China coastal freight ranked first, accounting for 40 percent and Yangtze freight ranked next, accounting for 31 percent. This shows the importance of Shanghai as a nucleus of home and foreign transportation and trade and of the consolidation of Shanghai industrial development with the national economy.

(c) For over a hundred years, Shanghai has been China's chief export port. Since liberation, it has changed the balance of excess import trade, a pattern of 70 years standing, and a thriving export business has continued. By the end of 1958 we maintained trade relations with more than 98 nations. Especially notable is the increase in trade relations among socialist states. From 1950 to 1958, Chinese-Polish trade was increased by 16 times, thus greatly strengthening the economic cooperation and coordination among socialist states. Of the major imports, 90 percent were machinery and equipment for industrial and agricultural production and fertilizer. Our industrial manufactures also constitute a major part of our export; in Shanghai in 1957 they accounted for more than 50 percent. With ineffectiveness of the US embargo plan, our agricultural and industrial and shipping production has been raised. We completed our first over-10,000-ton liner in November 1958. From now on, more ships are to call at the port of Shanghai. Its foreign trade will be more prosperous.

(d) Although coal, food, mining products, and metals constitute the bulk of Shanghai's imports and exports, they no longer serve the needs of imperialists as they did in the past. Instead, they supply the daily necessities to 6 million Shanghai residents and the materials for the construction of greater Shanghai and for its industries, such as coal, cotton, iron, and building material. Material supplies shipped to the interior by sea consist of imported raw materials, daily necessities, industrial manufactures, and material for interior construction. At present, transshipment rate is high: 46 percent in 1958. In the wake of Shanghai's industrial development and adjusted production plans throughout the nation, the

transshipment rate will be reduced. According to estimates, Shanghai's import and export capacity, after the Second Five-Year Plan, will be four to five times more than in 1957.

All in all, Shanghai is the greatest of trading ports to serve the need of socialist construction. Built on the foundation of mammoth industrial production, it takes advantage of its superior geographical location to regulate the flow of China's imports and exports and transportation. It will exercise even greater influence after the nationwide development of transportation, industry, and agriculture and after the reconstruction of Shanghai Harbor.

VI. CONSTRUCTION OF NATIVE RAILWAYS IN CHINA

/Following is a translation of an article by Chi Teh in T'ieh-tao Chou-k'an (Railway Weekly), No. 50, Peking, 1959, pages 16-17./

Since the building of native railways last year in Yuhsien, in Shanshi, in Weiyuang and Changyieu in Kangsu, more than 20 provinces and autonomous districts have followed suit in laying small railroad tracks with locally manufactured or imported steel. According to November statistics, Honan Province has completed over 130 kilometers of native railways; Anhwei, 20 kilometers divided into eight lines already in service; Shanshi, more than 20 kilometers divided into six lines already in operation; Kwangtung, over 70 kilometers of imported rail divided into five lines. Many others are already under construction.

These local lines run into steel and coal mining areas and lumber production districts where transportation is concentrated, serving as links with major railroad and water transportation lines. Those already in operation, despite their short period of operation and lack of experience, have manifested their advantages because of enormous loading capacity at low cost and small investment to ensure quick results by utilizing indigenous materials. From Lueiho to Wuyang in Honan Province, the cost of building native railways per kilometer is only one fifth the cost of major railways; the freight is cheaper than transportation by human labor; it costs only one eighth of motor transportation rate. The Yuhsien line in Shanshi Province can carry 800 tons of goods per day. This is equivalent to the loading capacity of over 260 large hand carts. Its estimated building cost, considering the local horse cart and automobile transport rates, can be paid for by the freight charges it saves in 8 months. A railway of more than one kilometer now connects the major railway line with the Hwei River waterfront in Bunpoo. It has a loading capacity of over 2,000 tons, which in the old days would have required the loading capacity of 1,000 large hand carts and almost 1,000 human laborers. The Hsiachiatsi mining line in Hweinan can ship 1,000 tons of coal, replacing the loading capacity of 300 hand carts. The railway staff consists of about 20 men for its operation and maintenance; much human labor is saved.

The building of native railways manifests mass spirit under party leadership. The local and regional party leaders are deeply interested in such projects. In many provinces, special organs have been set up to supervise native railway construction and transportation administration. There is a branch in charge of local railway administration under the Bureau of Communications in Shanshi Province. Committees on railway repair and construction is now being set up in Lueiho in Honan, in Tsao Kwan in Kwangtung and in Anhwei. Under party

leadership, the native railway construction plan in Anhwei is concentrated in coal and iron mining areas, reaching out from near into far distances, from the easy to the difficult, for the furtherance of native railway development projects.

Under party encouragement and guidance, the masses of people have learned by actual experience the significance of native railways in alleviating transportation difficulties. By virtue of their enthusiasm and self-reliance, they have overcome difficulties in order to realize their aim. The steel used to pave the Lueiho and Wuyang tracks in Honan is the fruit of more than 30 experiments by local engineers and mechanics. The local commune members gathered more than 200 tons of wrought iron, set up furnaces and manufactured more than 700,000 track nails and screw joints, to ensure early completion of the project. The model commune in Bunpoo, mobilized three caldron scraping workmen into a team to manufacture steel using high-temperature resistant earthen pots to melt iron. They succeeded in manufacturing a small steel rail weighing 13 kilograms and measuring one meter. After more than 20 experiments they succeeded in repairing a native railway one kilometer long. This is encouraging indeed. Since these men have succeeded under the most trying conditions, other commune members believe that they can do equally well.

The building of native railways fully manifests the spirit of Communism -- its cooperation and organization. In the past locomotive manufacture was unknown to Kwangtung Province. This year, through the cooperation of 40 factories in Canton, 20 small steam locomotives and over 100 freight cars were produced. In Anhwei, under combined factory management, three rail manufacturing plants have been set up in key locations. The Taiyuan Motor Factory and the Fuwu Machine Plant in Shanshi are now building locomotives and cars for native railways; the locomotives serving Lueiho and Wuyi line were built by a machine plant in Shichiajuan.

The railway administration has not slackened in mobilizing mechanical and technical power for the development of native railways to ensure the development of major railway transportation. When the Canton Railway Administration undertook the job of building locomotives, they feared that this undertaking would hamper locomotive checks and repairs, so some were reluctant to bear such responsibilities. On the other hand, those who cared to work for locomotive production failed to look after locomotive checking and repairing work. The party leaders in the railway administration lost no time in correcting the fallacy of such mentality. Measures were taken to ensure simultaneous production, checking, and repair work by reorganizing manpower and mechanical means with the aid of more lathe shop equipment contributed by Kwangtung Province. Both projects are being carried out with outstanding results.

The railway administration in Bunpoo has a section on technical advice, responsible for mapping out plans and making surveys and repairs. Rail and locomotive manufacturing plants have been set up in Chiuloongkan and Hafei in Anhwei. A branch on scientific study under the Changchow Railway Administration also assumes an advisory role in supervising native railway building. In building the Lueiho and Wuyang railway, it made the survey and organized a working team consisting of mechanical, technical, electrical and laboring units. They solved problems of railway communications administration, railway paving, rail manufacturing, casting different models of rails, and technics. They also built locomotives, and switches for the line. The Taiyuan office also dispatched 19 technicians to make a survey of the line. By order of the Ministry of Railroad, lightweight rails and switches were also shipped to meet the need. The Canton office in this year made a survey of more than 300 kilometers of native railways in the province and turned out many locomotives and trained several hundred motor men and conductors.

At present, native railway construction is still in progress. Efforts have been made by the groups concerned to standardize railway building, locomotive manufacturing, and railway administration.

VII. RAILWAY TRANSPORT GOALS FOR 1959

/Following is a translation of an article by Ma Kuo-yau and Shih Kung-su in T'ieh-tao Chou-k'an (Railway Weekly), No. 51, Peking, 1959, pages 8-11./

The railway administration and laborers, in pursuance of the Mao Tse-tung ideology and under party leadership, are now embarking on a mass movement. After a year of toil they have now successfully completed the mission of transportation and railway and locomotive building for 1959 before the scheduled time. They have kept it up with great earnestness, aiming at more production, so that the coming year may be a year of glory and prosperity.

A. Railway Transportation

Under the banner of victory, they have succeeded in mapping out plans for this year's transportation and are now striding toward the 1960 goals at an early date. So far, all plans have exceeded their pre-estimated marks. This again proves the veracity of party leadership in socialist construction.

The transportation plan this year is based on the perspective of last year's "great leap forward" in order to ensure a greater "leap forward." The railway administration and laborers have loaned unremitting efforts to promote transport production throughout the nation under party leadership, the campaign of anti-rightists, and mass stamina. In the first period, they were able to put out 32,500 cars per day; in the second, 36,391 cars. Freight during the first half of the year was increased by 49.5 percent compared with that of last year. Greater improvement of quality and safety can be visualized as they respond to the movement for more production and less consumption, and as they mobilize manpower and technical power for transportation purposes, especially after the Eighth Plenary Session of the Central Executive Committee. In September, the daily car output was 38,200, an increase of 3,500 cars over the rate of August. For the first half of November the estimated total car output was set at 40,100 daily, an increase of 1,800 cars compared with that of September. In December, despite cold waves during the first half of November, the record was 41,000 cars daily, the peak production record for the year. Freight car shifting time is now shortened to 2.36 days. This is remarkable indeed.

The great success in transportation this year was due to political vigilance under party leadership, in carrying out socialist construction. By virtue of the pioneering spirit and technical reforms under the mass movement, the present results were possible. In the early part of the year, the Kaotai station freight registered only 80 kilometers of low unit transportation, but has now increased to 480

kilometers. Hump yards have been repaired and increased to 91, which make up a total of 128 in the entire railway network. This increases the efficiency of railway mobility from 20 to 60 percent compared with the ordinary hump yard. The highest registered has been an increase of 100 percent. The standard of mechanized and semimechanized control of railway car shifting has also been raised. After the Eighth Plenary Session, a mass contest movement opened to further railway building and control. This movement also aimed at helping those who were lagging behind. For instance, in October, the Shen-yi Railway Administration in Gingchow, having learned the technique of laying steel rail, staged a huge demonstration of the technique. On 13 November, the Gingchow Railway Administration staged a contest of railway operation techniques, covering a distance of 767 kilometers from Shanhaikwan to Taipenchuan, with hump yards, 4 mechanical control sections, and 75 stations, with almost 20,000 persons participating. The train was operated according to standardized time schedule and shortened the trip to 6 hours and 45 minutes. From then on, technical demonstration contests would follow in succession during the development of railway production. After the technical demonstration contests were staged by the Peking Railway Administration, more than 600 logical suggestions were made to solve the many problems essential to railway building and operation, thus accomplishing the whole year transportation plans ahead of time.

In the past year, development of railway transportation under Communist cooperation at home and abroad has had remarkable success, unprecedented in history. In the wake of the cooperation between Pusing road work and Buanchi railway building plant there was the experience of the "one dragon" transportation corporation of Lukan in Chinhuantao. In order to further this experience, in the middle of November the ministries of Railway, Communications, Metallurgy, Coal, Petroleum and Forestry called a meeting on the promotion of transportation corporations and passed a resolution of organizing 378 "dragons" for the nationwide network of communications. At the same time, cooperation between the ministries of Commerce and Railway effected the development of united transportation, which was increased from 18,000 tons daily in April to 125,700 tons daily in mid-December, an increase of seven times. The highest was registered on 11 December at 182,000 tons, which was greater than the average annual transport rate in 1949. The experience of sharing a special service line by areas, east to Peking, such as Shihchiachuan, Harbin, Chiamusiu, Shenyi, Hwangtai in Tsinan and Tunghsia in Taiyuan, fully manifested the efficiency of the special line service. Coordination within the railway administration arranged contests of joint transportation, mechanical and electrical management, control of railway operation and traffic signals, and unity of station and mechanical control managements. This not only improves the relationship in production, but also increases productivity. The shortening of freight car shifting period during this year was mainly due to the efficiency of cooperation and coordination.

Now the railway masses under the guidance of the party are striding toward the coming year with greater hopes of success.

B. Railway Construction

The railway administration and workers have completed basic railway construction works ahead of time.

The major accomplishments this year were constructions for transportation needs and for iron and coal production. Besides, there was the construction of a new station in Peking, which took only 7 months and 20 days to complete and of a second bridge to span the Yangtze, from Chungking to Paishato, which was finished in October, 8 months earlier than expected. From Hokau to Sinin of the Lanchin Railway line works have been completed and railway transportation service was commenced on National Day. The Lansing Railway will complete its extension to Hamee by the end of the year. From Hsiangtun to Laudi of the Hsiangchian line, road work engineering is under way. Railway construction is rapidly growing to remedy the uneven distribution of railway network throughout the country. Now, except for Tibet, there are railways in every province and autonomous district. Along the Kingchen Railway Line, transportation service is now extended from Ingsiuyin to Kwanlao. This line is chiefly responsible for Peking's coal supply. Contributions to the completion of this line were made by such branch lines as Tonchiu-Laopu, Maishuikan-Pantien, Anyang-Litseng, Tiehlan-Faku, Chilin-Sulan and other related lines. The nation's first mechanized hump yard, the north station in Suchiatun, Shensi, is expanding.

New records for railway construction are registered for some of the following major projects. In bridge building, the Tatung River bridge between Kansu and Chinhai, a span of 111.6 meters, took only 23 days to build. The bridge engineering unit (second engineering corps), in laying the foundation for the Yangtze Bridge, has succeeded in improvising new concrete piling devices, which in 8 hours' time sink 128 meters, being 1.7 time greater than the average rate. In tunnel building, the Liangfunhia tunnel in Kweichow scored a monthly digging distance of 190.38 meters. For engineering competency and safety, in 5 years' time there has not been a single accident due to mechanical defect in the Sixth Engineering Corps of the First Engineering Section of Tsian Railway Bureau; in 5 years' time there has not been a single accident involving loss of life in the Fifth Engineering Corps under the same administration. There has not been a single accident in 7 years' time involving the loss of lives and mechanical blunders in the Lunbungfung section of the Wuhan Bureau, First Engineering Corps.

Now the railway building administration and workers have lost no time in keeping up with the mission ahead of time, so as to pave the way for greater construction and success in 1960.

C. Locomotive Production

Locomotive plant workers have already accomplished the goals for this year ahead of time in keeping with the assurance their representatives made at the nationwide production heroes' meeting.

The locomotive production rate from January to November was increased by 62.7 percent compared with that in the same length of time during the great leap forward period in 1958; freight car production increased by 77.4 percent; steel production, by 55.6 percent. Locomotive production has been on the ascent, especially after the inauguration by the Eighth Plenary Session of "antirightist, self-economy, and more stamina" movement, resulting in lifting the goal to a higher dimension at a monthly rate. If the July production rate is set at 100 percent, August's would be 127.6; September's, 170.7 percent; October's, 184.5 percent; and November's, 198.3 percent, registering an increase that exceeds the over-all plan for this year.

In the past year, a mass movement on labor contests among locomotive plant engineers and workers has been started giving emphasis to technical improvement. They have been able to keep up with their pledge with such accuracy that their performances, physical, technical and mechanical, have astounding results. While the mass movement for more production and self-economy was switched to an unprecedented high, the progressive would lead the less progressive in this production campaign in order to ensure an over-all "leap forward." In many cases, party cadres took part in labor, and workers took over administration, resulting in the integration of cadres, engineers, and technicians; workers, in solving the many problems essential to production, placed production standards on a higher level. For instance, the secretary of the party and the director of a locomotive plant in Chichihaer actually worked with engineers and workers and organized themselves into a mechanized production front, so that locomotive production rate has been raised by three times. The Changsintien Plant invented iron casting mold and simplified steel refinery process, thus enabling freight car accessory production to increase from 2 units monthly to 7 units and its applicability rate from 85 percent to 95 percent. This experience greatly fosters freight car production rate The Youwa section in Shengyang Plant, in employing a "three standardized" manufacturing process, enabled the section daily production to increase by 200 percent and the product quality to improve from 60 percent to over 98 percent. Outstanding was the increase in steel production rate after the demonstration of steel mounting process by many plants. Tsiyayin Plant staged a 10,000-man technical demonstration on 30 November with engineers, technicians and workers participating, making a new record on over 10,000 items of production details and realizing 544 items for improvement. Thus production rate was increased by 104 percent. Sifong Plant staged over 6,000 demonstrations in November and listed 734 items for improvement. Altogether there

has been improvement on 364 items; of the 244 problems essential to production efficiency, 204 have been solved to ensure the increase of production.

At present the locomotive plant is striding toward victory, to ensure the accomplishment of this year's goals and is making necessary preparations for the coming year.

VIII. DEVELOPMENT OF WATER TRANSPORTATION IN HONAN

/Following is a translation of an article by the Bureau of Communications in Honan Province in Shui-yun (Hydraulics), No. 1, Peking, 1960, pages 8-9./

Inland water transportation in Honan, during the great "leap forward" in agricultural produce, with guidance from the party and the cooperation of more than 50,000 workers, scored a great success in 1959. It was expected to cover six and a half million tons of freight in 1959 which was 149 percent of the year's plan. This was increased by 1.22 times, compared with that in the great forward period in 1959; it was accomplished two and a half months ahead of time before entering 1960. It has accomplished the Second Five Year Plan transport goals, shortening the time by three years and three months.

Greater speed was registered for basic transportation construction. By the end of October, 33 navigable channels, covering 1,125 kilometers had been opened. This represents an increase of 150 percent compared with that in 1958. The project consisted of: increasing channel conservancy to 202 kilometers; clearing alluvial deposit at 110 places covering a distance of 16,979 meters; installing sailing signals over a distance of 206 kilometers including 25 signal posts. In shipbuilding there are 32 new tugboats of 2,221 horsepower, a more than 100 percent increase over the number registered during the First Five-Year Plan. There are 1,314 new sailboats of 18,026 tons, twice the number registered for 1958.

Honan inland water transportation is still in its primitive and natural stage, because the rivers are shallow. Navigating power is generally low. During the great 3-month drought of July 1959 unprecedented in the province's history, over 2,000 kilometers of navigable streams were banked up at 100 places, thus causing several major navigating channels to dry up and suspending the service of 60 percent water navigation and 40 percent shipping. This poses a serious problem for Honan inland water transportation.

Yet even under this trying condition we were able to score a great success. This is due to party leadership in launching a mass movement for better techniques and technical improvement, to carry out communications construction plans and control based on mass efforts and local support.

To Launch Mass Movement Under Party Leadership

1. By repeated struggles, to launch a mass movement. The inland water transportation in Honan has changed its former pattern of a slack period early in the year and a rush season in the latter part. To adjust this unequal distribution, we have mobilized manpower against ice seal and drought. Soon we opened up contests on loading and sailing

speed, on technical improvement and on united action under party guidance contests were held between river and river, squadron and squadron, unit and unit, boat and boat, until the movement penetrated deep into every corner of the province. The movement further enhances development of Yellow River transportation and ensures the accomplishment of plans for 1959, which, compared with those in 1958, mark an increase of 96 percent.

In April, a meeting was called at Kaifeng to appraise the results of the contests, to extend the movement and to set goals accurately. In August the goal set for monthly tugboat horsepower production was 10,000 tons per kilometer; sailboat, 1,000 tons per kilometer. The results were outstanding. In November, there were 38 units throughout the province embarking on the 1,000 tons per kilometer project.

2. Antirightist movement, along with more stamina to overcome difficulties. With the advent of serious drought in July and August when the river became shallow and the streams dried up, a small portion of the masses fell into the fallacy of rightist thinking of relying on nature and rain. As a result, production dropped to a considerable extent. In checking the error, we thoroughly upheld the resolution of the Eighth Plenary Session to fight rightist thinking and to battle against drought. More than 1,000 men made this pledge in Huaibo, Nanyang, and Saho. In Huaipin harbor, 1,700 workers were mobilized daily for the clearance of eight shallow water sand deposits to maintain the shipment of 2,500 tons of wheat for export. Huitien harbor put 300 men to work day and night and dredged the shallow river bed to 300 meters to sustain a supply of 3,000 tons of coal for the masses of people along the river coast. Eight harbors in the Siping area engaged 600 or more boats to shoot up five meter high embankment at 100 places to maintain normal transportation. Under this mass movement, in 3 months, we have accomplished dredging of shallow water sands at 110 places, covering a length of 16,979 meters. Therefore, during the low water level period in September, we were able to ship 570,000 tons of goods, an increase of 70 percent compared with those in August.

3. To ensure the continued development of transportation by use of brain and sinew. Because of increasing transportation demands, the masses of workers have been seeking improved mechanical devices that would prove highly efficient in saving time and human labor. After a meeting in Changsha, a new movement was launched for technical improvement. By the end of October, improvement of boat models covered more than ten kinds, including 799 boats. The new boats are able to ply shallow waters at swift speed and to save labor and cost. Three hundred and sixty kinds of sailboat parts, equipment and accessories of 3,600 pieces have been under improvement, such as fishing net sails, multi-rudders and water-powered sail hoisting equipment, all of which are economical and highly serviceable. During the 10 months

in 1959 5,700 tons of goods were shipped and 4,747 passengers were carried. This is equivalent to building more than 570 boats of 10 tons each.

In sailboat transportation, trailers occupy 60,000 tons, or 50 percent of the total shipping. Trailing transportation is now in operation in the Huai River, the Huichi River, and the Anyang River. Trailing speed is increased by 20-30 percent, thus to effect dual productivity with the same amount of labor. Thus sings the praise of boatmen:

> For a sailboat to tow another boat
> Never was such heard of in history,
> To ensure doubled productivity afloat
> We learn and produce the same story.
> Thanks to party leadership
> Transport mission is made anew.

For harbor loading and unloading, we have devised 19 kinds of equipment, such as coal funnels, loading and unloading machines, wooden cranes. At present, eight of the province's harbors are equipped with semimechanized loading and unloading processes; loading and unloading rates have been increased by two to frou times.

In ship repairs, shipbuilding and river dredging, to remedy the shortage of material supply, substitutes are now being used experimentally. Reed is used for boat building; 20 reed boats have been built since 20 November. For boat repairs along the Sa River, the Huai River and the Yellow River, the use of rice straw, of saw dust and of wood gum from poplar bark and pine branches to replace tung oil in filling boat leaks has been a great success. This not only overcomes the difficulty of material shortage, but also reduces the costs of repair.

Strengthening Transportation Control by Regulating the Six Transport Keys

1. To regulate material supply and shipment at its base of production. This is an over-all adjustment of shipment and goods at the source of supply by a balanced evaluation of these procedures: plans for shipment, loading, and reloading for the return trip. The adjustment requires a monthly review of goods supply at all sources. Using natural location factors in transportation planning such as main streams or tributaries, upper and lower streams prevents waste of return shipping power. This procedure greatly enhances transport efficiency.

2. To regulate the shipping process by adjusting sailing line, unit, number, schedule and mission, to provide a logical distribution of work between large and small boats. According to this

system, every shipping unit will determine its sailing number based on the nature of its mission to increase transport efficiency.

3. To regulate harbor work. This is intended to improve harbor administration by investigating storage, freight and shipment preparations, loading, unloading and harbor clearance procedures, in order to boost harbor lifting efficiency. In the Huai River, party cadres have worked out a "five plan" transport procedure from land to boat, thus shortening the time for boats waiting in harbor. In the Luei River, a "ten-in-one" cooperative measure is being conducted to solve the problem of boats kept waiting for loading and unloading. In Tungchu harbor a united transport system is being devised to alleviate shipping congestion, loading or unloading as soon as boats call at the harbor, and none is allowed to stay overnight.

4. To regulate mechanical control. Regular checking on machines and equipment safeguards the maintenance of regular transport service. The tugboat service on the Wei River, by virtue of this control, boosted its transport rate from 50 percent to 80 percent or more.

5. To regulate navigating channel. For conservation of navigation channels, constant dredging and clearing are carried on by channel sweeping workers and sailors, to maintain deep water, swift sailing speed and sailing safety.

6. Leadership in planning, in investigating, in summing up results, and in estimating time, labor and mission. This ensures the smooth, uninterrupted flow of freight.

Mass Efforts in Communications Construction and Transport Service

1. Because of the great "leap forward" in industrial and agricultural production, the present transportation facilities are inadequate to meet the growing need. Therefore we have to mobilize mass efforts in the endeavor of making transportation a major profession and making a side job of augmenting the means of communications. By organizing over 14,000 tons of supplementary shipping, in 10 months' time we have accomplished the shipment of over 1,470,000 tons of goods and supply, or 27 percent of the total shipment rate in the province. This makes shipment and transportation a mass movement indeed.

2. Uniting with hydraulic construction to promote water transportation to alleviate tensions and pressure on highway transportation. In the past, Honan utilized water transportation in the south and land transportation in the north. The custom has become so deep-rooted that it would be hard to open up an over-all water transportation movement. But after a year of demonstration and actual observations, more and more people have realized the importance of the movement and are being put to work in river dredging and boatbuilding. For more than 10 months, they have worked to open up 33 streams of 1,000 kilometers, not including major navigating channels. Tsunhsien opened up navigable

channels measuring 113 kilometers and 125 other waterways covering a total distance of 1,350 kilometers. There are 54 local shipyards employing 2,662 workers. At present they have completed 10 tugboats and 1,199 sailboats. (The Hsinhiang special district has set its goal of sailboat building at 1,000 units over 10,000 tons.) Luanhsien, in four months' time, has cleared 120 kilometers of waterways, built 39 boats, and shipped 4,500 tons of foodstuffs and coal, saving 9,145 labor days compared with manpower transportation.

At present, Honan water transportation is built on a firm foundation. The province administration has been looking forward to constructing 10,000 boats of 100,000 tons from last winter to this spring and to dredging and opening up 10,000 kilometers of streams and waterways.

IX. TSINGTAO HARBOR USES HARBOR LOADING AND UNLOADING UNIT BUSINESS ACCOUNTING

/Following is a translation of an article by the Sea Transportation Bureau in Shangtung Province in Shui-yun (Hydraulics), No. 1, Peking, 1960, pages 15-17./

Editor's note: Business accounting done by the loading and unloading units themselves is an effective device to test the results of mass administration in the shipping industry. By such methods, many harbor bureaus promote the industry at low costs. We believe that the experience of Tsingtao harbor demonstrates effective ways to mobilize mass participation under party leadership. First, they devise different business accounting methods for different districts. Next, they set a hypothetical point on which to base a total computation. Then, they formulate an over-all accounting method, subject to further discussion, debate, and revision. The following is the method used in business accounting after three months of trial and error.

A. Making Preparations Beforehand

1. To strengthen leadership in administration. Using loading and unloading units to handle business accounting is a complicated process, which requires the leadership of a specific organization. Under the harbor administration, an accounting unit in charge of studying and solving major problems is formed. Then there are branch units throughout all districts to prepare accounting data.

2. To formulate methods for different districts involves exploring different possibilities to arrive at an accurate conclusion. Each district puts its methods into practice as an experimental system. Then the central unit, having been given the methods and data by all districts, formulates a uniform accounting method for them all to follow.

3. To set a hypothetical point and to test it step by step. The harbor loading and unloading industry is complicated. We lack experience. Therefore, it would be safe to set a hypothetical point to base on and then to proceed with our computation, in order to avoid setbacks and interference with the whole procedure.

4. To instill accounting knowledge and to select accounting personnel. Before the trial and error period, there should be a mass meeting to educate the participants with knowledge of accounting, its significance and its goal, so that they may understand that their part in it is a step further toward business administration. Such methods ensure more production at low cost. During mass orientation, responsible persons are to make use of leisure time to train accounting personnel and to organize cadres in charge of branch units' accounting. The

trainees should directly take part in guiding accounting methods during the initial stage of trial and error.

B. Goals and Methods of Accounting

Based on a tentative total accounting during the trial and error period, a uniform accounting method will be formulated. This method is subject to repeated discussion, debate, and revision to arrive at an accurate accounting method. The goals of standardized accounting methods are the following:

1. Primary goals:

(a) To convert labor tonnage, computation is based on the standard piecework wage and time schedule. That is, piecework time schedule x labor tonnage.

(b) To calculate the unit cost of labor tonnage.

2. Secondary goals:

(a) Labor service frequency is based on the present accounting index.

(b) Natural and artificial producing rate. That is labor production rate converted into tonnage rate divided by the number of laborers per unit.

(c) Safety rate, including loss of lives, physical injury and goods damage.

3. Cost accounting:

(a) Wage. For the convenience of accounting, each labor unit will estimate the unit wage scale per head. The method is: The number of laborers multiplied by wage unit per head equals the total wage cost per day for the whole labor unit.

(b) Wage on sick and injury leave. Take the actual number of laborers on leave, multiplied by the unit wage per head.

(c) Equipment charge. The actual number of equipment and machines used and the duration of time should be multiplied by charge under classified charts.

(d) Damage to goods, tools, and equipment. Round up the actual cost incurred by the damage, including private and public responsibilities.

4. Accounting methods:

(a) Announcement and investigation of goals. At the beginning of each month, each labor unit is to be given a production goal (in terms of labor tonnage) and attached goals, such as natural and artificial production rates and labor service frequency. No goal is given for cost accounting since we lack experience. Then we conduct a study of actual production and attached goals based on estimated goals. In checking cost accounting goals, the study is based on the proportion of the average unit cost.

(b) Actual procedure of goals accounting. The accountant of each labor unit will check the daily figure, then the total figure

will be announced by the district every five days, and at the beginning of the coming month the names of labor units that have reached the average goal will be posted.

C. Solution of Problems During Trial and Error Period

1. The problem of determining accurate production goals. This is a complicated problem in loading and unloading units' business accounting. The problem is whether it is to be based on labor tonnage or on converted labor tonnage computation. During the initial stage of application, large harbor business accounting districts usually employ labor tonnage calculating methods; in the case of medium-sized harbor districts, the method is to sum up easy and difficult loading and unloading goods into more than 10 categories and to formulate more than 10 constants to arrive at labor tonnage and transcomputation methods; small harbors divide goods into four categories and base on time and loading and unloading rate in order to arrive at transcomputation methods. As a result, transcomputation methods based on conversion constants are comparatively easy and convenient. The labor tonnage calculation method does not reach a logical production goal because the actual labor involved in loading and unloading is conditioned by different loading processes, easy or difficult, and by varied efficiency. So after two days of experiment, it was shifted to conversion tonnage calculation. In the case of small harbor accounting processes, the result is logical but the process is complicated.

After a period of trial and error, the transcomputation method is most desirable. But how to convert the calculation method poses a problem. To base on a conversion constant, which can be either too large or too small, leads to inaccuracy. Finally, after much debate and discussion, a decision was made to base on calculation of loading and unloading wage, time per piece at a fixed amount.

Based on this principle the method has the following advantage:

(a) To have detailed classifications of easy and difficult loading and unloading goods and to avoid formulating conversion constants.

(b) To enable the laborer to know the exact wage he earns and his contribution to the country.

(c) To strengthen control of wage per piece unit as this concerns the laborer's own interests.

2. Problems of equipment service charge.

Based on the experience of Shanghai harbor, the primary step is to divide loading and unloading equipment into several categories. Then the service charge per hour must be calculated according to the maximum years of service of a tool and its cost. But in our trial and error period we are confronted with the following problems:

(a) Problems of determining equipment and tool service time. In order to effect a quick turnover of tools, the service time is determined from the time of their leaving the store room to the time of their return. But because it is too high, this calculation is illogical. The workers feel that they should be charged according to the number of hours of actual operation. Finally, the charge has been determined from the working hour until the equipment is returned to the store room.

(b) More equipment and tools required for loading and unloading mixed goods supply. In this case, tool service charge will be estimated according to the number of hours of actual operation. This is called adjusted tools service charge rate.

(c) To lower costs, some working units refrain from using loading and unloading safety and protection equipment. Consequently, for the safety of production and work, all safety and protection equipment is, for the time being, to be lent out free of charge.

3. Problems concerning business accounting on odd job labor. Unlimited odd job labor, if performed during on duty hours, should not be treated by transcomputation methods, nor should this be applicable to four hours of performing odd job labor. Items exceeding four hours' time should be treated as limited odd job labor; part of the labor should be treated as unlimited labor and the wage cost should be computed according to the whole day wage scale.

4. Problems concerning labor lending, shifting among working districts, and business accounting of mutual labor lending and shifting costs.

(a) In labor shifting and lending, transcomputation is to be borne by the lending labor unit in accordance with the stipulated goals at estimated unit costs of borrowing labor unit.

(b) In computing mutual lending and shifting labor costs, transcomputation is to be borne by the number of laborers of the lending unit together with tool service charges. In case of damage done to goods and tools the responsibility is to be borne by the lend-out laborers.

5. Questions of whether machine and tool service charge should be borne by the labor unit. It was first stipulated that machine and tool service charge should be borne by the labor unit. Since the cost of using tools and machines is high and since the transcomputation method is based on loading and unloading unit cost and time per piece at fixed amount, the computation of machine service cost has lost its significance. So during the trial and error period, tool and machine service charge is not to be computed.

6. Question of who should be responsible for the computing. There are those who believe that it would be better for accounting personnel to be in charge of computing, for the accounting indices worked out by the laborers has to be rechecked, thus making the job more complicated. In large harbors, this is the responsibility of

accounting personnel, but in medium-sized harbors it is in the hands of laborers. Of course, the results are different. The advantage of entrusting accounting to the laborer is that he will watch carefully the cost of labor and production rate and keep it up from time to time without fear of delay as is frequently the case when the job is vested in the hands of accounting personnel. For laborers to be responsible for their own business accounting is in conformity with the principle of direct participation in business administration.

D. Evaluation of the Accounting Project

1. Major results:

(a) To mobilize mass workers in business accounting is an effective measure for improving business administration under "one reform and three cooperative" system. In this case, the workers will be able to understand the meaning of cost and how to lower cost. They now understand that only by efficient loading and unloading can the cost of production be reduced.

(b) The average worker will be more careful in using tools and material. For instance, the seventh labor unit in a medium-sized harbor borrowed eight ropes. After appraising the need, they discovered six would be sufficient. So they returned two to the store room. In the past, a great deal of material was wasted, because workers did not know how to calculate cost.

(c) The furtherance of labor unit business accounting is an effective means of mass participation in business administration to lower production cost; this has enabled our third period loading and unloading costs to be reduced by 16.06 percent.

(d) The distribution of manpower under mass business administration can be better adjusted. Too much manpower is a waste and lowers labor efficiency. For instance, in a medium-sized harbor on 14 October, 17 men were put to work on a ship unloading job; actually, 13 would have been sufficient. The labor unit discovered the waste and automatically sent back four. In a small harbor loading and unloading assignment, the distribution of manpower was in error: the workers wasted an hour's time in traveling back and forth then asked the office in charge to be responsible for the loss. The mass business administration movement incorporates the function of business supervision.

(e) The strengthening of tool and material control to avoid waste and loss is a merit of the mass business administration. The control will estimate the service charge of tools used and set a rate for replacement and payment of losses.

2. Points of understanding:

(a) Party's role as the center of cooperation and guidance is its basic guarantee.

(b) To mobilize the masses of workers in this movement requires more education to goad them on to this complicated job, which they abhor. At the same time there must be a concentrated effort to prepare and train accounting personnel, especially since they are to assume guiding roles during the period of trial and error.

(c) For workers to participate in business accounting is a mass control of cost.

(d) In accounting of loading and unloading production goals, it would be better to resort to transcomputing process because labor and production efficiency is estimated in this way. This would facilitate labor shifts and distribution.

E. Some Major Problems To Be Solved

1. The question of issuing cost goals.

We believe that the issuance of production and cost goals must be done at the same time, so that workers will be able to estimate the goal by computing the given cost. However, up to the present there has not been any adequate computing process to come by the goals.

2. The question of business accounting awards for labor units. Some believe that cash awards ought to be paid out from profits gained; some, from wage foundation. As for the standard of receiving awards, it is suggested that the production rate and unit cost must exceed the average estimate level.

3. The question of accounting results and time limit. It is planned that the accounting process must be over at about 20 minutes' time after performance of duty and announced in detail during the meeting of all labor units. The delay by accounting personnel will result in the delay of computing by the labor unit.

The above questions are being studied. It is hoped they can reach a solution based on the experiences of other districts.

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